31st Annual Meeting of the DPS, October 1999
Session 43. Mars Surface: Structure
Contributed Oral Parallel Session, Thursday, October 14, 1999, 10:30am-12:00noon, Sala Plenaria

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[43.05] Timing of Martian Magnetic Anomalies

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Measurements of the martian magnetic field indicate strong (1500nT) anomalies that likely represent remnant magnetization of the crust. These anomalies are 1) generally confined to the southern highlands, but are absent in the regions of Hellas and Argyre, and 2) in the region 120 -240W, 0- 90S, have a linear geometry along an east-west strike for 1000s km, leading to the suggestion that some form of lateral plate tectonics may have been active in the southern hemisphere of Mars [Acuna et al., Science, v. 284; Connerney et al. ibid.]. The lack of significant anomalies in the northern lowlands requires that the dynamo was active prior to the formation of the highland/lowland dichotomy. Theories to explain the formation of the dichotomy are this constrained by these data, specifically, the formation of lowlands by a single giant impact require that the strong dynamo operated and ceased within 100 Ma of the planet's formation. All models of the formation of the lowlands require a mechanism that destroys the magnetic signature, heating up the crust above the Curie point by mechanisms such as impact, melting, delamination or subsidence. Timing of the strong dynamo is further constrained by our examination of the spatial and topographic relationship between the published magnetic anomalies with mapped material units. Preliminary results show no significant spatial correlation between the anomalies and mapped units or present day topography. This requires that the strong dynamo operated prior to and deeper than oldest Noachian plains, as well as Hellas, Isidis and Argyre.

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